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NEW GENUS AND TWO NEW SPECIES OF THARYBIDAE (COPEPODA CALANOIDA) FROM THE GULF OF MEXICO WITH REMARKS ON THE STATUS OF THE FAMILY

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ABSTRACT

A brief historical review of the family is presented. Several salient characters common to the Tharybidae, Scolecithricidae, Phaennidae, and Diaixidae are discussed. It is suggested that these families comprise a natural group within the Paracalanina.

The present difficulties in separating the Scolecithricidae from the Tharybidae on the basis of existing diagnoses are pointed out. The need for a thorough revision of the Scolecithricidae is stressed. Adding to previous revision of the Tharybidae, it is proposed that *Pseudotharybis* Scott, together with its two species, *P. zetlandicus* Scott and *P. dubia* Scott, be treated as incertae sedis. These taxa appear to lack characters fundamental to the other members of the family.

A diagnosis is presented for a new genus, *Parundinella*, that is related to *Undinella* Sars. The new genus is compared to other genera of the family in a synoptic key. Two new species of *Parundinella* from the Gulf of Mexico, *P. spinodenticula* (the generotype) and *P. manicula*, are described.

NEW GENUS AND TWO NEW SPECIES OF THARYBIDAE (*COPEPODA CALANOIDA*) FROM THE GULF OF MEXICO WITH REMARKS ON THE STATUS OF THE FAMILY

By Abraham Fleminger, *Fishery Research Biologist*

Two heretofore undescribed species representing new genus of an obscure family of marine calaoids, the Tharybidae, have been found during udies on the copepod fauna of the Gulf of Mexico. he plankton samples that contained these forms e part of the extensive collections made by the . S. Fish and Wildlife Service M/V *Alaska* in the ulf of Mexico between 1951–1953. Apparently, is is the first record of tharybids from the estern North Atlantic region.

REMARKS ON THE THARYBIDAE

Sars (1902) originally conceived of the family ame Tharybidae to place *Tharybis macrophthalma* rs, a northeastern Atlantic species of the monoypic genus *Tharybis* Sars. A second genus, *seudotharybis*, was added by Scott (1909a) for vo species from waters off the British Isles. anaka (1937) proposed a third genus (monotypic) r a species from Suruga Bay, Japan, which rodski (1950) recently synonymized under *Unnella* Sars. Brodski also removed *Undinella*, gether with its three species, from the Scolecithcidae and placed it within the tharybid complex. is apparent from the available data that rodski's tharybid revision was justified.

The position of the Tharybidae in relation to the maining families of the Calanoida has not been tablished satisfactorily. Although the family usually included in Sars' section, the Isokerania, it is now widely recognized that this section nstitutes a heterogeneous complex unacceptable a natural system. At present, it seems best place the tharybids under Gurney's supermily, Paracalanina, in a subgroup following the haennidae, the Scolecithricidae, and the Diaixidae. Although there is as yet little tangible evidence to support this move, it is noteworthy that these families are similar in the following basic characteristics: (1) the occurrence of sensoriform filaments and falcate spines on the second maxillae, (2) organization of the fifth legs, (3) segmentation of the swimming legs, and (4) form of the rostrum. Moreover, in the above order these families present an apparently natural and progressive line of development, to the extent of secondary specialization of the appendages (e. g., atrophy of the male cephalic appendages, complexity of the sensoriform filaments, development of the fifth legs, spinulation and flattening of the swimming legs). Admittedly, these similarities and their serial relations have been somewhat overgeneralized, but they strongly suggest a closer relation between these families than that generally held at present.

The need for a formal description of the tharybid complex is urgent but the lack of sufficient details concerning most of the species prevents its presentation at this time. For example, attempts at precise separation of the tharybids and scolecithricids meet with difficulty. The usual structures of significance (such as body and appendage segmentation, as well as arrangement and setal ornamentation of appendages) are for the most part similar, or at least tend to intergrade between the two families. In this respect *Scolecithricella ctenopus* (Giesbrecht) and the new genus described present major obstacles to such a separation.

Thus far a survey of the literature and study of a limited quantity of reference material has revealed that only the swimming legs appear to exhibit consistent differences. As to the thary-

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bids, in addition to the lack of conspicuous spinulation on the anterior and posterior faces of the rami, the endopodal segments are not broadened, nor is the lateral margin lamelliform and produced distad in a prominent spiniform process. Other distinguishing characteristics may be forthcoming from consideration of the mouth parts, especially the mandibular dentition, and the number of setae on the first and second maxillae. It should be stressed that thorough revision of the Scolecithricidae, suggested previously by Vervoort (1951), and restudy of extant tharybid material is necessary to resolve the present confusion.

Within the Tharybidae further revision is needed to complete the foundation laid down by Brodski. It appears that *Pseudotharybis* Scott must be removed from the family. According to Scott (1909a) the generotype (*P. zetlandicus* Scott) is distinguished from *Tharybis* by the lack of sensoriform filaments on the second maxillae and by the truncate nature of the mandibular gnathal lobe. As mentioned, the sensoriform filaments are characteristic of all other known species of Phaennidae, Scolecithricidae, Diaixidae, and Tharybidae. Although their function remains to be established, it seems obvious from preliminary examinations (unpublished data) that these filaments are significant, if not vital, sensory receptors. Moreover, many other workers have already suggested their probable sensory function. It does not seem reasonable, therefore, to assume that these filaments are secondarily lost in *Pseudotharybis*, nor is there any evidence that Scott's genus represents primitive tharybid stock.

There are also fundamental differences between the tharybids and known species of *Pseudotharybis* regarding the mandibular gnathal lobe. In contrast to that described by Scott for *Pseudotharybis*, the tharybid gnathal lobe is typically elongate and the teeth, excepting the two most ventral, tend to be spiniform or styliform.

Although Scott's (1909a, b) descriptions of both *Pseudotharybis* and his two species included therein, *zetlandicus* and *dubia*, are inadequate for determination of their actual phyletic relations, the eventual removal of these taxa from the tharybid complex appears a virtual certainty. For example, there are several interesting points of similarit between *Pseudotharybis* and *Drepanopsis* Wol enden. Pending restudy of Scott's material hov ever it is proposed that the genus and its speci be treated as incertae sedis.

Genus *Parundinella*, new genus

Description.—Tharybids resembling those the genus *Undinella*, according to Sars (1900:5 and Brodski (1950:275), although considerab smaller in size. Cephalon fused with thorac segment I, thoracic segment IV fused wit segment V; terminal portions of fusion se ment IV–V produced posteriad in lobiform spiniform processes; genital segment symmetrica swollen laterad at midportion, ventral portion most only weakly produced. Abdomen with segments in female, 5 in male; anal segment both sexes reduced in length, considerably short than preceding segment. Rostrum with simp bifurcated basal portion; each bifurcation art culating with a slender filament. First antenna with segments 8–9, 24–25 fused in female; se ments 8–10, 20–21, 24–25 fused in male. Mand bular gnathal lobe elongate; only 3–4 monocusp date spiniform teeth present, confined dorsalmost portion of lobe. First maxillae wit inner lobe 1 moderate in size, not broad or truncat Second maxillae with lobe 5 bearing two senso form filaments, one normal seta, one enlarge falcate seta; terminal segments with 5–6 senso form filaments; filaments occasionally with apic flagellum. Exopodite of legs 1–4 three-segmente endopodite of leg 1 one-segmented, leg 2 tw segmented, legs 3–4 three-segmented. Extern exopodal spines of legs 2–4 ornamented with sma denticles along upper and lower margins. Fema fifth legs minute, two-segmented; terminal se ment with one or more distal acuminate process and one robust medial spine bearing ventr spinules. Male fifth legs biramous, asymmetrica left exopodite three-segmented, left endopodit two-segmented; right exopodite two-segmente right endopodite in part fused with second bas segment. Remaining structures as in family.

P. spinodenticula, new species, is herewith de ignated the generotype of the new genus.

SYNOPTIC KEY TO THE GENERA OF THARYBIDAE

Segments 24 and 25 of first antennae fused; mandibular gnathal lobe with 3–4 monocuspidate spiniform teeth; female fifth legs with 2 segments; male right fifth leg with conspicuous endopodite; external exopodal spines of legs 2–4 bearing marginal denticles ..... *Parundinella*

Segments 24 and 25 of first antennae separate; mandibular gnathal lobe with more than 4 monocuspidate spiniform teeth; female fifth legs with 3 segments; male right fifth leg with endopodite vestigial or lacking; external exopodal spines of legs 2–4 not ornamented or bearing fine hairs 2

Thoracic segment I and cephalon partially separated; segments IV and V fused or separated; rostrum with bifid basal portion; first maxillae with inner lobe 1 not of greater surface area than remaining lobes and rami, endopodite extending to or beyond distal border of inner lobe 1, exopodite with 2–3 setae; maxillipeds with segment 2 of uniform thickness; female fifth legs with segments more or less equal in length; terminal spine of legs 2–4 with fine shallow serrations; lobes of second maxillae crowded within distal half of appendage ..... *Undinella*

Thoracic segment I fused with cephalon, segments IV and V fused; rostrum with rounded knob-like basal portion bearing 2 long filaments; first maxillae with inner lobe 1 large, extending beyond remainer of appendage, exopodite with 5 setae; maxillipeds with segment 2 swollen, greatest thickness at midlength; female fifth legs with terminal segment longer than preceding 2; terminal spine of legs 2–4 with coarse deep serrations; lobes of second maxillae extend over more than half of appendage ..... *Tharybis*

It is noteworthy that several of the characters ed in separating the 3 genera tend to intergrade follows: (1) ratio of surface area of inner lobe to remaining lobes and rami of first maxillae rgest in *Tharybis;* less in *Undinella;* smallest in *rundinella);* (2) segmentation of female fifth legs segments of about equal length in *Undinella;* sal and mid-segments considerably reduced in *arybis;* loss of 1 segment, presumably the second, d reduction of basal segment in *Parundinella);*) segments 24 and 25 of the first antennae (separ- e in *Tharybis* and *Undinella;* fused in *Parundi- lla spinodenticula*, new species, but partially parated in *P. manicula*, new species).

Parundinella spinodenticula, new species

PLATE 1, FIGS. 1–16; pl. 2, FIGS. 1–11.

Localities, Material.—Gulf of Mexico: lat. 22° 20′ N., g. 87° 31′ W., (*Alaska*, cruise 4, station 11, 13 January 52, 1 meter depth of plankton tow; 2 adult females, 1 ersexed individual); lat. 23° 18′ N., long. 97° 38′ W., *laska*, cruise 2, station 11, 7 June 1951, 1 m. depth of ankton tow; 1 adult male).

Measurements.—Specimens measured in dorsal ew. Length of cephalothorax along midsagittal ane from anteriormost limit of forehead to post- ior margin of intersegmental membrane between oracic fusion segment IV–V and genital seg- ent; length of abdomen from anterior margin of nital segment to posteriormost limit of right rcal ramus. Measurements made at 100x mag- fication with aid of ocular micrometer; speci- ens immersed in aqueous solution of 50 percent ycerine. Slender glass rods used to support phalothorax and abdomen in horizontal position uring measurements of each specimen.

Measurements given include total length (TL) and cephalothorax-abdomen length ratio (CAR).

1. ADULT FEMALE: (holotype) TL 0.84 mm., CAR 3.1:1; (paratypes) TL 0.83 mm.; TL 0.84 mm.
2. ADULT MALE: TL 0.74 mm.; CAR 2.7:1.

Description.—A minute tharybid characterized at low magnifications by a robust ovate cephalothorax with first antennae extending to thoracic fusion segment IV–V and a short slender abdomen about half as long as the fourth pair of swimming legs.

ADULT FEMALE: Cephalothorax robust, greatest depth between maxillipeds and first legs; forehead strongly vaulted (pl. 1, figs. 3, 5; pl. 2, fig. 11). Rostrum with distal half of basal portion bifid, each process bearing a short rostral filament (pl. 1, fig. 8). Terminal portions of thoracic fusion segment IV–V in lateral view produced in a triangular lappet with rounded apex, extending posteriad beyond midlength of genital segment (pl. 1, figs. 3, 5).

Genital segment in dorsal view with moderate lateral swellings confined to anterior three-fourths of segment; segment narrowed abruptly just posterior to seminal receptacles (pl. 1, figs. 5, 16). Four abdominal segments and furcal rami with proportional lengths taken along midsagittal plane of 37, 19, 19, 8, 17 (=100). Furcal rami approximately twice as long as broad, each bearing 6 setae; 4 most terminal setae elongated, almost equal in length; lateral and medial setae shorter than ramus, unequal in length (pl. 1, fig. 5).

Cephalic appendages differing in several details from corresponding appendages of *Tharybis.* First antennae (pl. 1, fig. 4) with 23 visible seg-

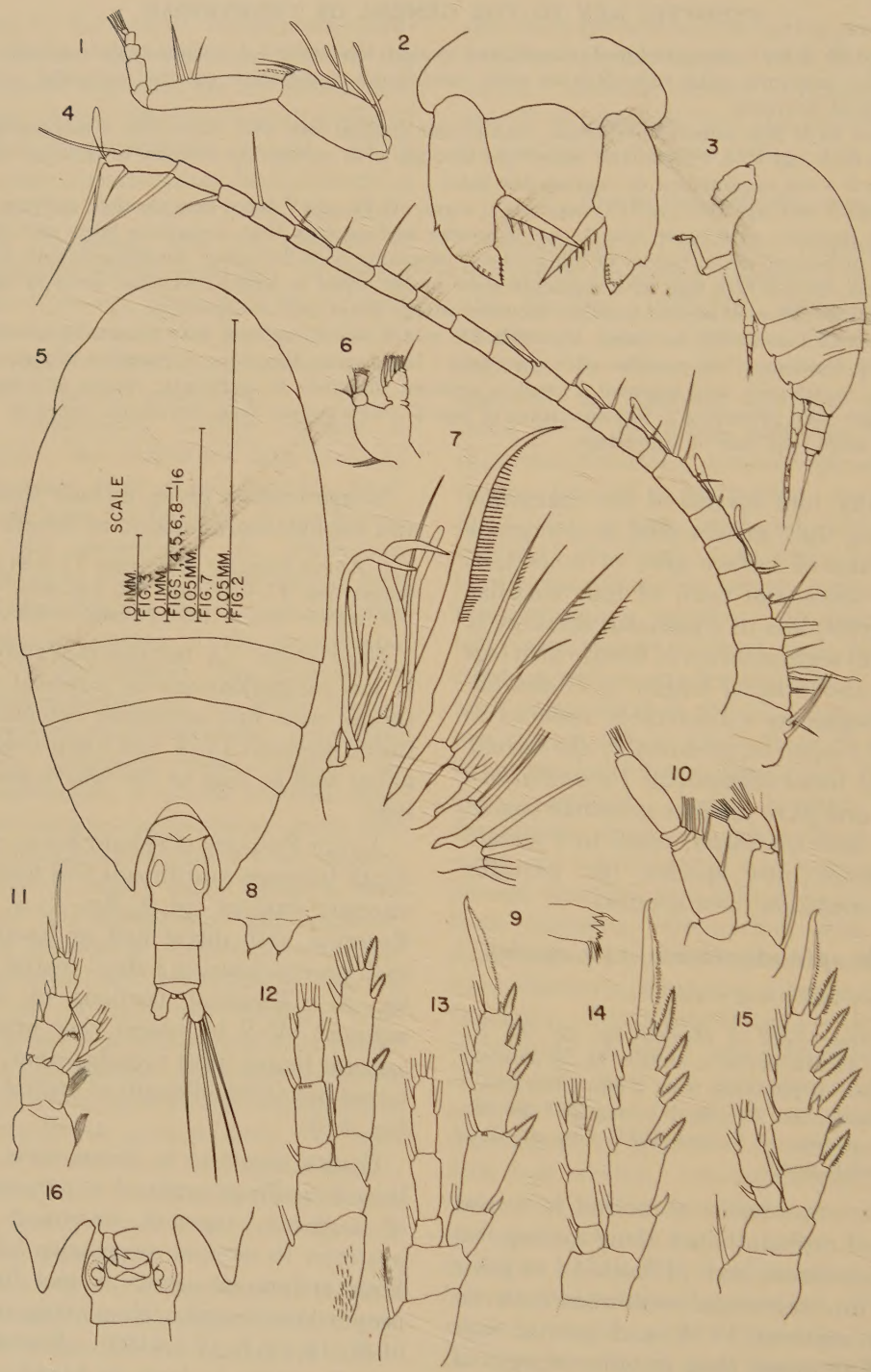

PLATE 1.—*Parundinella spinodenticula*, new species. Female: 1, Maxilliped; 2, Fifth legs; 3, Trunk, lateral vie
4, First antenna; 5, Trunk, dorsal view; 6, Mandibular palp; 7, Lobes of second maxilla; 8, Rostrum, anterior vie
9, Mandibular gnathal lobe; 10, Second antenna; endopodite with inner lobe of segment 2 damaged, lacking one or mo
setae; 11, First leg; 12, Fourth leg, abnormal; 13, Fourth leg; 14, Third leg; 15, Second leg; 16, Genital segment, fif
leg, terminal thoracic segment, ventral view. (All figures drawn with aid of camera lucida; all except figure 12 of holotyp

ents, about as long as cephalothorax. Mandibular gnathal lobe (pl. 2, fig. 2) with more than alf the cutting area comprised of molariform eeth, only dorsalmost 3 teeth setiform. First axillae (pl. 2, fig. 8) with endopodite two-egmented, not fused with second basal segment; ner lobe 1 with 12 robust spines; lobe less than alf total area of appendage. Second maxillae l. 1, fig. 7; pl. 2, fig. 9) with lobe 5 bearing two ensoriform filaments, one seta, and one robust lcate spine; terminal segments with total of pproximately 5 sensoriform filaments (exact umber could not be determined), each somewhat longated, exceedingly thin-walled, and flexible; laments apparently unspecialized at apex. Maxlipeds (pl. 1, fig. 1) with first segment bearing hree sensoriform filaments and 2 setae on proxnal lobe.

Swimming legs 1–4 as figured (pl. 1, figs. 11, 3–15); leg 4 approximately twice as long as bdomen (pl. 1, fig. 3). Leg 1 with each segment f exopodite bearing an external spine; spines nequal in length; endopodite with rounded ateral shoulder bearing numerous spinules. Exernal exopodal spines of legs 2–4 with sagittiform enticles ornamenting upper and lower margins.

Fifth legs minute, symmetrical, uniramous, two-egmented (pl. 1, fig. 2); basal fusion segment hared by left and right rami; each unisegmental amus with total of 3 processes, an apical cone earing spinules along lateral and medial margins, robust medial spine bearing a ventral row of pinules, and a small lateral spur just proximal to pical cone.

Adult male: Thorax, cephalic appendages xcept for first antennae, and swimming legs imilar to those in female. First antennae with 1 visible segments (pl. 2, fig. 1). Abdomen with segments and furcal rami; second segment longst, anal segment shortest.

Fifth legs biramous; first basal segments parially fused, second basal segments separate, unqual in length, left side longer. Right exopodite ith first segment elongated, curving mediad; econd segment reduced, bearing 1 apical seta. Right endopodite with first segment fused to basal egment, second segment reduced, weakly sclerotized. Left exopodite three-segmented, proximal egment longest; short distal segment bearing erminal and proximal spines, medial face hirsute. Left endopodite two-segmented, shorter distal segment scoop-like.

Types (*cf. Localities, Material*).—All deposited in United States National Museum. Female holotype, No. 99189, selected from material of *Alaska*, cruise 4, station 11. Paratypes, Nos. 99190–99191.

Remarks.—The new species can be readily identified by the following combination of characters: the denticulated external spines of the swimming legs; the terminal lappets of thoracic fusion segment IV–V, which, in lateral view, are somewhat triangular and cover most of the genital segment; the conical apex and medial spine of the female fifth legs; the unusual endopodite of the male right fifth leg, consisting of an elongated process fused to the second basal segment and bearing a reduced apical segment.

Parundinella manicula, new species

Plate 2, fig. 12; Pl. 3, figs. 1–13

Localities, Material.—Gulf of Mexico: Lat. 23° 18′ N., long. 97° 38′ W., (*Alaska*, cruise 2, station 11, 7 June 1951, 1 m. depth of plankton tow; two adult females).

Measurements.—Techniques as in preceding species.

Adult Female: two specimens, each with similar dimensions; TL 0.81 mm., CAR 3.0:1.

Diagnosis.—In general resembles *P. spinodenticula*, differing chiefly in details of rostrum, thoracic fusion segment IV–V, and swimming legs.

Terminal portion of each side of thoracic fusion segment in lateral view produced in short spiniform process barely overlapping genital segment (pl. 3, fig. 5). Rostrum with filaments longer than basal portion (pl. 2, fig. 12; pl. 3, fig. 7). Second maxillae with terminal segment bearing 6 sensoriform filaments; lobe 5 with 2 such filaments; at least 4 maxillary filaments with flagelliform apex (pl. 3, fig. 4). Leg 1 with shoulder of endopodite conical, bearing encircling row of spinules (pl. 3, fig. 12). Legs 2–4 with external spines of exopodite bearing fine hair-like denticles; endopodites of legs 2–3 with moderate number of spinules on posterior face (pl. 3, figs. 9–11). Fifth legs with two segments; basal segment reduced; terminal portion of distal segment with 3 outstretched spiniform processes fringed with hairs; medial margin of distal segment with robust spine bearing ventral row of spinules; face of distal segment ornamented with unevenly distributed spinules (pl. 3, fig. 13).

Types (cf. *Localities*).—The two adult females, from which *P. manicula* is described, were dis-

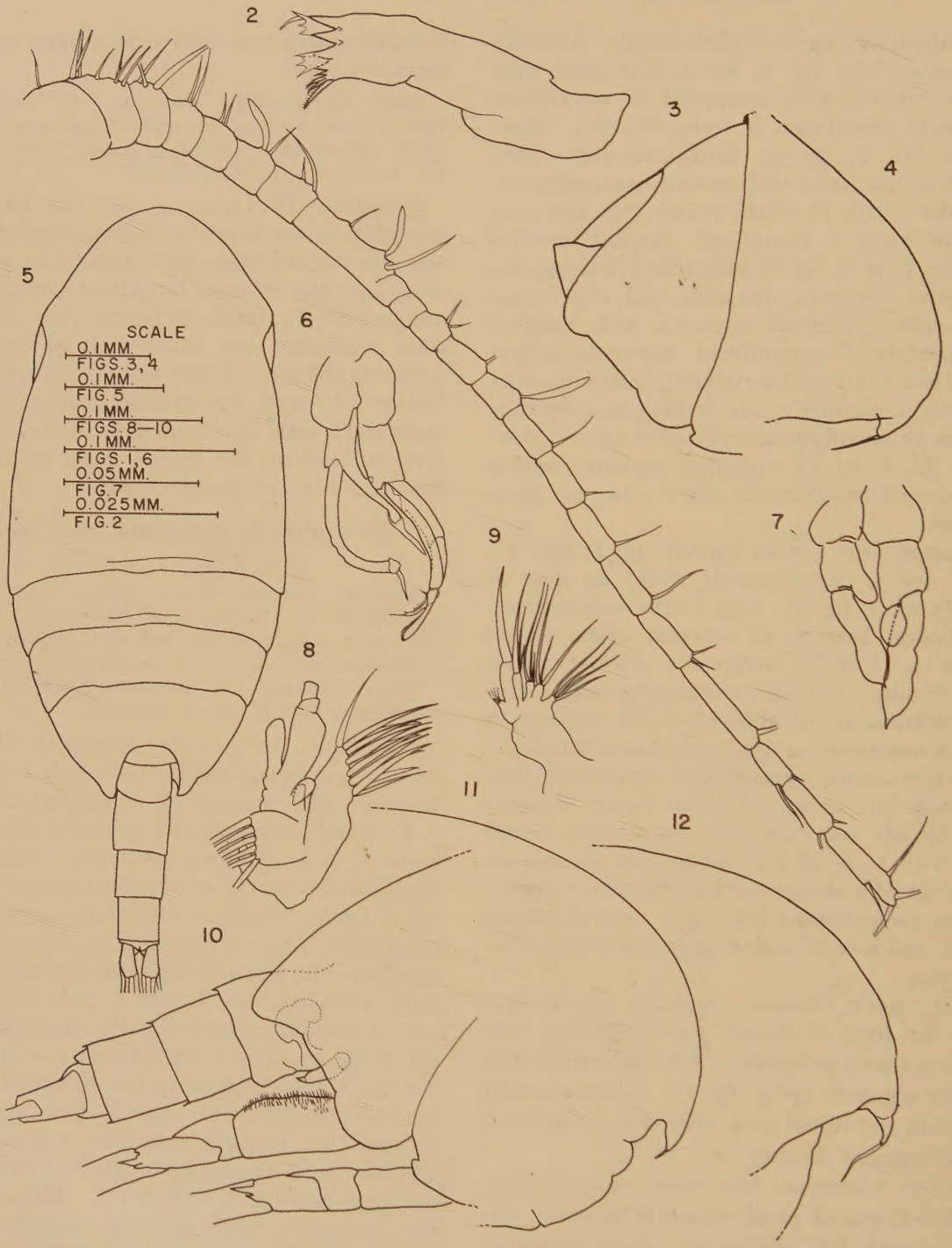

PLATE 2.—*Parundinella spinodenticula*, new species. 1, Male first antenna; 2, Female mandibular gnathal lobe 3, Male thoracic segments IV–V, lateral view; 4, Male forehead, lateral view; 5, Male, dorsal view; 6, Male fifth legs 7, Fifth legs of intersexed specimen; may be similar to those of penultimate male copepodite but genital segment in this specimen similar to that of mature female; 8, Female first maxilla, setae of rami, inner lobes 2–3, omitted; 9, Female second maxilla, terminal setae omitted; 10, Female abdomen, terminal thoracic segment, lateral view; 11, Female forehead lateral view. 12, *Parundinella manicula*, new species; Female forehead, lateral view. (All figures drawn with aid of camera lucida; figures 1–11 of paratypes, figure 12 of syntype.)

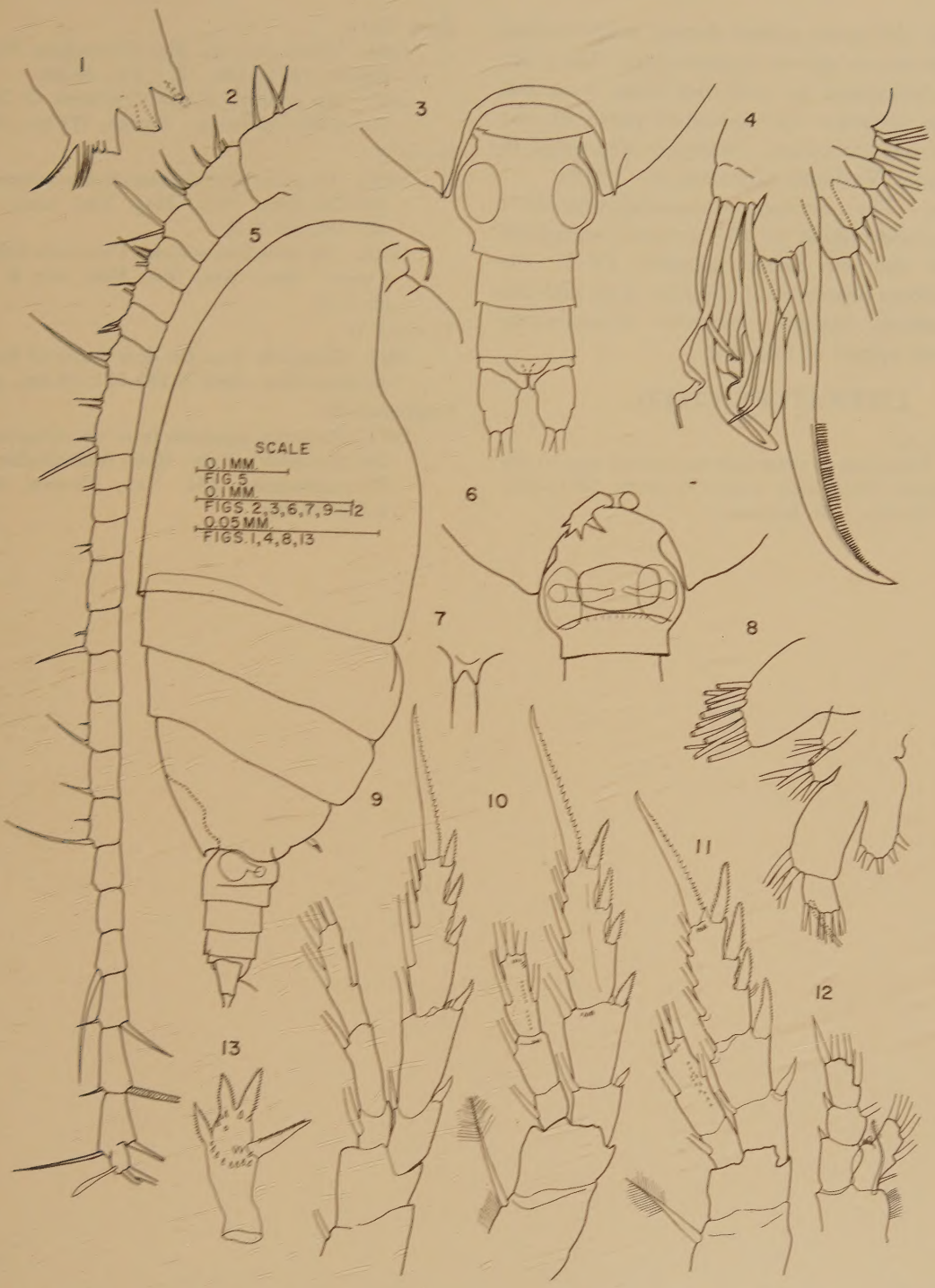

PLATE 3.—*Parundinella manicula*, new species. Female: 1, Mandibular gnathal lobe; 2, First antenna; 3, Abdomen, rsal view; 4, Second maxilla; 5, Trunk, lateral view; 6, Genital segment, fifth legs, terminal thoracic segment, ventral ew; 7, Rostrum, anterior view; 8, First maxilla; 9, Fourth leg; 10, Third leg; 11, Second leg; 12, First leg; 13, Fifth leg mal segment. (All figures drawn with aid of camera lucida from syntypes.)

sected and the parts mixed during study before their status as new species became clear. They are herewith designated as syntypes since it is not possible to separate the dissected parts of one specimen from the other. Syntypes deposited in United States National Museum, No. 99192.

Remarks.—The new species is readily separated from *P. spinodenticula* by the terminal spiniform process of thoracic fusion segment IV–V, the three spiniform processes of the fifth legs, and the slender, almost hairlike, denticles ornamenting the external spines of legs 2–4.

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